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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/902,673	07/12/2001	Michimasa Funabashi	843.37558VX1	3110

20457 7590 12/07/2001

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EXAMINER
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ART UNIT	PAPER NUMBER
2825	

DATE MAILED: 12/07/2001

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/902,673	Applicant(s) Funabashi	
	Examiner Lex Malsawma	Art Unit 2825	

-- The MAILING DATE of this communication appears on th cover sheet with the correspondence address --

Peri d f r R ply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 July 2001* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-19* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-19* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Pri rity under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☒ Certified copies of the priority documents have been received in Application No. *09/392,568* .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 3 .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim Objections

1. Claim 2 is objected to because of the following informalities:

In line 4, "solut4on" should read "solution".

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 5 and 12 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 5 and 12 are indefinite because it is not clear what temperature should be considered to be "an ordinary temperature" or "a temperature nearly equal thereto". Examiner interprets the temperature of the processing solution to be any convenient temperature.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

5. Claims 1, 2, 5, 8, 9, 12-16, 18, and 19 are rejected under 35 U.S.C. 102(b) as being anticipated by Szwejkowski et al. (5,296,093).

Regarding Claims 1, 2, and 5:

Szwejkowski et al. disclose (in Figs. 3-4 and col. 3, lines 36-56) a method of manufacturing a semiconductor integrated circuit device comprising the steps of:

(a) providing a silicon wafer 2 covered with an insulating film whose main surface is mainly silicon oxide 4 (note Fig. 3); and

(b) cleaning the main surface of said silicon wafer with a processing solution which includes hydrogen peroxide, hydracid fluoride salt (e.g., ammonium fluoride), and water, wherein the temperature of said processing solution would be an ordinary temperature. Therefore, the instant claims are anticipated by Szwejkowski et al.

Regarding Claims 8, 9, and 12-14:

Szwejkowski et al. disclose (in Figs. 1-4 and col. 3, lines 36-56) a method of manufacturing a semiconductor integrated circuit device comprising the steps of:

(a) providing a silicon wafer 2, from a surface of which silicon oxide 4 and silicon 28 (e.g., polysilicon, note Fig. 4) are exposed;

(b) cleaning the surface of said silicon wafer with a processing solution which includes hydrogen peroxide, hydracid fluoride salt (e.g., ammonium fluoride), and water, wherein the silicon 28 exposed from the surface of said silicon wafer is a silicon film (e.g., polysilicon) constituting a gate electrode, and the temperature of said processing solution would be an ordinary temperature. Note Szwejkowski et al. refer to silicon oxide 4 as a "gate oxide" (see col.

1, lines 54), i.e., exposed silicon 28 would be a gate electrode since silicon oxide 4 is a "gate oxide". Furthermore, silicon 28 (exposed from the surface) can be considered to be a substrate. Therefore, the instant claims are anticipated by Szwejkowski et al.

Regarding Claims 15, 16, 18, and 19:

Szwejkowski et al. disclose (in Figs. 1-4 and col. 3, lines 36-56) a method of manufacturing a semiconductor integrated circuit device comprising the steps of:

cleaning a surface of a silicon wafer with a processing solution containing hydrogen peroxide, hydracid fluoride salt (e.g., ammonium fluoride), and water; and

exposing a silicon layer 28 (Fig. 4) from the surface of said silicon wafer, wherein said silicon layer 28 is a silicon film constituting a gate electrode (note layer "4" is a gate oxide). It is noted that the silicon layer 28 can be considered to be a substrate. Therefore, the instant claims are anticipated.

6. Claims 1, 2, 5, 6, 8, 9, 12, 13, 15, 16, and 18 are rejected under 35 U.S. C. 102(e) as being anticipated by Yoon et
al. (6,117,350).

Regarding Claims 1, 2, 5, and 6:

Yoon et al. disclose (in Fig. 4 and cols. 2-4) a method of manufacturing a semiconductor integrated circuit device comprising the steps of:

(a) providing a silicon wafer 10 covered with an insulating film (12 or 14) whose main surface is mainly silicon oxide (note col. 3, lines 43-55);

(b) cleaning the main surface of said silicon wafer with a processing solution which includes hydrogen peroxide, hydracid fluoride salt (e.g., ammonium fluoride), and water (note col. 3, lines 15-18 and col. 4, lines 36-41), wherein the temperature of said processing solution would be an ordinary temperature. Note in col. 2 (lines 21-22), Yoon et al. disclose the processing solution(s) may include a surfactant. Therefore, the instant claims are anticipated.

Regarding Claims 8, 9, 12, and 13:

Yoon et al. disclose (in Fig. 4 and cols. 2-4) a method of manufacturing a semiconductor integrated circuit device comprising the steps of:

(a) providing a silicon wafer 100, from a surface of which silicon oxide (12 or 14) and silicon are exposed (note col. 3, lines 43-55, "damaged" silicon is exposed within trench 106, i.e., the surface of wafer 100 includes the "damaged" silicon and silicon oxide "12" and/or "14");

(b) cleaning the surface of said silicon wafer with a processing solution which includes hydrogen peroxide, hydracid fluoride salt (e.g., ammonium fluoride), and water (note col. 3, lines 15-18 and col. 4, lines 36-41), wherein the temperature of said processing solution would be an ordinary temperature. It is noted that the silicon exposed from the surface can be considered to be a substrate. Therefore, the instant claims are anticipated.

Regarding Claims 15, 16, and 18:

Yoon et al. disclose (in Fig. 4 and cols. 2-4) a method of manufacturing a semiconductor integrated circuit device comprising the steps of:

cleaning a surface of said silicon wafer 100 with a processing solution containing hydrogen peroxide, hydracid fluoride salt (e.g., ammonium fluoride), and water (note col. 3, lines 15-18 and col. 4, lines 36-41); and

exposing a silicon layer from the surface of said silicon wafer (note in col. 3, line 43 to col. 4, line 10; a "damaged" silicon layer within the trench is removed such that a layer of silicon would be exposed). It is noted that the silicon layer exposed from the surface can be considered to be a substrate. Therefore, the instant claims are anticipated.

7. Claims 1-5, 7-13, and 15-18 are rejected under 35 U.S.C. 102(e) as being anticipated by Ohmi et al. (5,990,060).

Regarding Claims 1-5 and 7:

Ohmi et al. disclose (in Figs. 5-6; col. 2, lines 32-34; col. 8, lines 56-62; and TABLE 1) a method of manufacturing a semiconductor integrated circuit device comprising the steps of:

(a) providing a silicon wafer 3 covered with an insulating film 4 whose main surface is mainly silicon oxide;

(b) cleaning the main surface of said silicon wafer with a processing solution which includes hydrogen peroxide, hydracid fluoride salt (e.g., ammonium fluoride or tetraalkyl ammonium fluoride "TMAF"), and water (note col. 3, lines 15-18 and col. 4, lines 36-41), wherein said processing solution includes HF and HF_2^- as etching seeds of silicon oxide and the temperature of said processing solution would be an ordinary temperature (e.g., 25 °C). Note in col. 8 (line 62), Ohmi et al. disclose utilizing ultrasonic vibration. Therefore, the instant claims are anticipated.

Regarding Claims 8-13:

Ohmi et al. disclose (in Figs. 5-6; col. 2, lines 32-34; col. 8, lines 56-62; and TABLE 1) a method of manufacturing a semiconductor integrated circuit device comprising the steps of:

(a) providing a silicon wafer 3, from a surface of which silicon oxide 4 and silicon 3 are exposed;

(b) cleaning the surface of said silicon wafer with a processing solution which includes hydrogen peroxide, hydracid fluoride salt (e.g., ammonium fluoride or tetraalkyl ammonium fluoride "TMAF"), and water (note col. 3, lines 15-18 and col. 4, lines 36-41), wherein said processing solution includes HF and HF_2^- as etching seeds of silicon oxide and the temperature of said processing solution will inherently be an ordinary temperature (e.g., 25 °C). It is noted that the silicon wafer can be considered to be a substrate. Therefore, the instant claims are anticipated.

Regarding Claims 15-18:

Ohmi et al. disclose (in Figs. 9-10; col. 9, lines 47-59; TABLE 2: and TABLE 3) a method of manufacturing a semiconductor integrated circuit device comprising the steps of:

cleaning a surface of a silicon wafer 3 with a processing solution containing hydrogen peroxide, hydracid fluoride salt (e.g., ammonium fluoride or tetra-methyl ammonium fluoride "TMAF"), and water; and

exposing a silicon layer from the surface of said silicon wafer 3 (Fig. 10). It is noted that the silicon wafer can be considered to be a substrate. Therefore, the instant claims are anticipated.

Conclusion

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Liu (4,171,242), Ichikawa et al. (5,374,581), Moore et al. (5,402,807), Inoue et al. (5,412,240), Tsuji (5,454,901), Ilardi et al. (5,498,293), and Ohmi et al. (5,803,956) are cited to show processing solutions containing hydrogen peroxide, hydracid fluoride salt, and water.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lex Malsawma whose telephone number is 703-306-5986.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Smith can be reached on 703-308-1323. The fax phone numbers for the organization where this application or proceeding is assigned are 703-305-3431 for regular communications and 703-305-3431 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

Lex Malsawma

November 21, 2001

MATTHEW SMITH
SUPERVISORY PATENT EXAMINER
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